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PCT/IL 2005 / 000269

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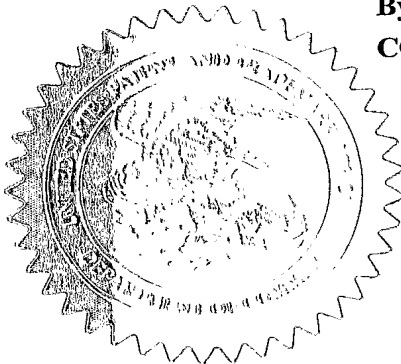
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APPLICATION NUMBER: 10/797,278

FILING DATE: March 10, 2004

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UTILITY
PATENT APPLICATION
TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.

A&Z 21.058

First Inventor

D. REIS

Title

IMMOBILIZING AND.....

Express Mail Label No.

EV332249628US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO:

Mail Stop Patent Application
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1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☒ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification [Total Pages 9]
(preferred arrangement set forth below)
- Descriptive title of the invention
- Cross Reference to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to sequence listing, a table,
or a computer program listing appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 5]
5. Oath or Declaration [Total Sheets 2]
a. ☒ Newly executed (original or copy)
b. ☐ Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 18 completed)
i. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s)
name in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).
6. ☐ Application Data Sheet. See 37 CFR 1.76

7. ☐ CD-ROM or CD-R in duplicate, large table or
Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
a. ☐ Computer Reader Form (CRF)
b. Specification Sequence Listing on:
i. ☐ CD-ROM or CD-R (2 copies); or
ii. ☐ Paper
c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS


9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 CFR 3.73(b) Statement of Power of Attorney
(when there is an assignee)
11. ☐ English Translation Document (if applicable)
12. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122
(b)(2)(B)(i). Applicant must attach form PTO/SB/35
or its equivalent.
17. ☐ Other:

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.:Prior application information: Examiner _____ Art Unit: _____
For CONTINUATION OF DIVISIONAL APPS only; The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

☒ Customer Number: 026304 OR ☐ Correspondence address below

Name			
Address			
City	State	Zip Code	
Country	Telephone	Fax	
Name (Print/Type)	Thomas J. Bean	Registration No. (Attorney/Agent)	44,528
Signature		Date	03/10/2003

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT

(\$) 385.00

Complete if Known

Application Number

Filing Date

First Named Inventor

D. REIS

Examiner Name

Art Unit

Attorney Docket No.

A&Z 21.058

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None☒ Deposit Account:Deposit Account Number
Deposit Account Name

50-1290

Katten Muchin Zavis Rosenman

The Director is authorized to: (check all that apply)

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1001 770	2001 385	Utility filing fee	385
1002 340	2002 170	Design filing fee	
1003 530	2003 265	Plant filing fee	
1004 770	2004 385	Reissue filing fee	
1005 160	2005 80	Provisional filing fee	
SUBTOTAL (1)			(\$) 385

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims	Extra Claims	Fee from below	Fee Paid
14	-20** =	9	
Independent Claims	1	-3** =	43
Multiple Dependent			

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description
1202 18	2202 9	Claims in excess of 20
1201 86	2201 43	Independent claims in excess of 3
1203 290	2203 145	Multiple dependent claim, if not paid
1204 86	2204 43	** Reissue independent claims over original patent
1205 18	2205 9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2)

(\$)

**or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code (\$)	Small Entity Fee Code (\$)	Fee Description	Fee Paid
1051 130	2051 65	Surcharge - late filing fee or oath	
1052 50	2052 25	Surcharge - late provisional filing fee or cover sheet	
1053 130	1053 130	Non-English specification	
1812 2,520	1812 2,520	For filing a request for ex parte reexamination	
1804 920*	1804 920*	Requesting publication of SIR prior to Examiner action	
1805 1,840*	1805 1,840*	Requesting publication of SIR after Examiner action	
1251 110	2251 55	Extension for reply within first month	
1252 420	2252 210	Extension for reply within second month	
1253 950	2253 475	Extension for reply within third month	
1254 1,480	2254 740	Extension for reply within fourth month	
1255 2,010	2255 1,005	Extension for reply within fifth month	
1401 330	2401 165	Notice of Appeal	
1402 330	2402 165	Filing a brief in support of an appeal	
1403 290	2403 145	Request for oral hearing	
1451 1,510	1451 1,510	Petition to institute a public use proceeding	
1452 110	2452 55	Petition to revive - unavoidable	
1453 1,330	2453 665	Petition to revive - unintentional	
1501 1,330	2501 665	Utility issue fee (or reissue)	
1502 480	2502 240	Design issue fee	
1503 640	2503 320	Plant issue fee	
1460 130	1460 130	Petitions to the Commissioner	
1807 50	1807 50	Processing fee under 37 CFR 1.17(q)	
1806 180	1806 180	Submission of Information Disclosure Stmt	
8021 40	8021 40	Recording each patent assignment per property (times number of properties)	
1809 770	2809 385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810 770	2810 385	For each additional invention to be examined (37 CFR 1.129(b))	
1801 770	2801 385	Request for Continued Examination (RCE)	
1802 900	1802 900	Request for expedited examination of a design application	

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$)

SUBMITTED BY

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Registration No. (Attorney/Agent)

44,528

Telephone

Signature

Date

03/10/2004

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Immobilizing and supporting inflatable splint apparatus

FIELD OF THE INVENTION

The present invention relates to the field of medical devices, and, more particularly, it relates to inflatable versatile/universal/multi purpose splints.

BACKGROUND OF THE INVENTION

The traditional techniques of providing support and immobilization in orthopedic conditions revolves around three types of devices: casts, which have application primarily in broken limbs; splints, which are used to immobilize and stabilize the limbs and the torso; and pressure bandages, which help control swelling and give a degree of support.

Creative individuals have come up with a variety of departures from these standard themes in order to achieve better patient treatment. Inflatable pouches made from elastic materials exist, adapted to be filed with either liquid or gas, and incorporating means for securing these pouches to the injured part of a human body and tightening them around it. Splints of this kind effect the immobilization and compression of a limb or other part of a human body.

One of the alternative devices is presented in U.S Pat. No. 5,954,676.

This device utilizes two sets of multi-layer deformable materials, such as fiberglass shims located in pouches in first and second members having re-sealable bladders or sheaths that provide structural support on each side of the limb.

The main drawback of the device, which limits its application considerably, relates to its fixed and inflexible shape that does not take into consideration the rounded form of the limbs, joints and the torso, for instance.

A different device is U.S Pat. No. 5,288,286, which is an adjustable pressure cast for orthopedic injuries. It is composed of three sets of air chambers and is only designed for treating orthopedic leg injuries such as fractures. As in the previous patent, this device suffers from an inconvenient structure, which may

only support the calf, the ankle and the foot of a patient without conforming to the shape of these structures.

There is a need for a method and a concept for a light and convenient splint which adjusts to the shape of the limb, joints or any other body part in question and may also provides steady support to the trunk (i.e. spine, ribs, neck etc.), while at the same time allowing free blood circulation, ventilation and enables medical inspection of the injured area.

SUMMARY OF THE INVENTION

In accordance with the shortcomings of previous art, it is a principal object of the present invention to provide a splint device which will present a maximum adjustment range, so it can be easily and securely fitted to the injured body part, without bringing about any uncomfortable chafing and minimize the overall discomfort, will also allow for adequate blood circulation to the injured part, and support the joints in an optimal position with a controllable measure of rigidity.

It is yet another object of the present invention to introduce a multi purpose splint that will be appropriate for the treatment of a wide range of conditions, such as fractures and sprains and post-operative support, prevent bedsores and allow inspection of various wounds. It provides a handy solution for the temporary support of an injured limb in field conditions while transporting a patient, for example, can also be used as a long term cast or bandage in the full course of treatment and may give postoperative support.

The said splint offers solutions for the setting and treatment of various areas of the body, such as the neck, the limbs, spinal and chest areas. It answers the basic need for a simple device, which is easy to use, handle, store and transport.

It is yet another object of the present invention to offer a practical solution to the needs of various medical teams such as hospital staff, EMS, health and care for the elderly, army and police emergency teams as well as private home use.

The invention describes a splint designed to allow for an adjustable and comfortable fit to different parts of the body which achieves maximum comfort and facilitates the recuperation period. It is a simply structured splint, which allows for uncomplicated assembly and operation. The splint is designed to fit the shape of the body part in need of treatment. It provides support and wrapping for the injured area from three sides. The splint is made out of inflatable ribs. Using a hand pump or an air pressure source tank the ribs may be inflated to various degrees that provide the optimum support and comfort required for the particular conditions. Ventilation holes in the structure allow for sufficient airing and circulation of the limb and body part and the treated area. The splints are secured into place by Velcro straps. The simplicity of the design and assembly enable the patients themselves to assemble and adjust the splint.

BRIEF DESCRIPTION OF THE DRAWINGS

These and further features and advantages of the invention will become more clearly understood in the light of the ensuing description of a preferred embodiment thereof, given by way of example only, with reference to the accompanying drawings, wherein-

Figure 1 is a perspective view of a first embodiment of the invention in an unassembled and un-inflated condition;

Figure 2 illustrates the first embodiment of the invention assembled on a leg.

Figure 3 illustrates perspective view of a second embodiment of the invention in an unassembled and un-inflated condition.

Figure 4 illustrates a cross sectional view (section A) of the second embodiment as illustrated in figure 3.

Figure 5 illustrates the second embodiment of the invention assembled on an arm.

Figure 6 illustrates a cross sectional view (section B) of the second embodiment as illustrated in figure 5.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is a new and simple medical device, aimed to help treat orthopedic conditions, by supporting and splinting immobilizing the injured body part in a desired position. It is a comfortable to wear lightweight device, which is simple, easy to assemble, water resistant and demands very little storage space. This is a multipurpose device facilitating emergency and long term treatments of different sorts of conditions.

The preferred embodiments of the invention are inflatable and adjustable, suited to fit different body part including the limbs, the chest, the torso, spine and the neck. The measure of air pressure inflating the device and the manner of fastening it around a body part are controllable and may be adjusted to suit the specific needs of any given condition. The device is made from a double layer of nylon coated by polyurethane, a flexible and a light weight material which is also strong and waterproof.

Fig.1 offers a general description of the first embodiment of the invention, suited for leg injuries, in an unassembled condition. The splint 10 is comprised of a main body 20 and two or more unattached adjustable straps: an front upper strap 6 and a front lower strap 7. When in use, parts 24, 25, 26a, 26b wrap the leg from three sides: part 24 holds the left side of the leg and part 25 the right side, while the back of the leg is wrapped by the splint central part 26a, 26b. Connecting Velcro surfaces 30 and 6 fastens the device around the calf.

The lower right 40a and left part 40b of the splint wraps around the foot, while part 41 covers the sole of the foot. Attaching Velcro straps 31 to strap 7 on top of the foot and strap 42a to 42b at the sole fastens the lower part of the splint for supporting the lower part of the foot. Fig. 2 illustrates the device as it is assembled on a leg 59.

Both the lower and the upper part of the splint have ventilating holes 52 to increase the comfort of long term use of the device, and at the edge of parts 40a, 40b, there are loops 50 which, if necessary, allow for suspending the leg raised up on a hook 55 to prevent it from swelling, as illustrated in figure 2.

Parts 24, 25, 26, 40, 41 contain inflatable tubes. These tubes are designed to wrap the leg, the foot, the ankle and the heel of the injured, taking into account the leg's curves and structure for maximum compatibility. Using the hand pump 16, which is connected to the said tubes through pipe 5 and valve

17, the tubes in the splint may be inflated. Alternatively, an air pressure source can be connected to valve 17 and used for the same purpose. Once inflated, valve 15 may be used to open the airways and let the air out of the tubes. Combining the effect of the hand pump 16 and the valve 15 allows for achieving the desired pressure in the tubes resulting in the required stiffness of the splint 10 around the leg, so that the support needed is maintained and the movement and flexibility of the leg is controlled without causing unnecessary discomfort. The pressure that the air tubes create on the leg does not obstruct the blood flow to the leg, and the ventilation holes 52 allow for sufficient airing of the area. When inflated, the splint takes up the shape of the part of the body for which it was designed as figure 3 illustrates.

Additional control over the amount of pressure and the tightness of the splint on the leg may be achieved by the fastening or loosening of the Velcro straps 6,7 to splint Velcro 30 and 31 respectively. In a different embodiment Velcro straps 6 and 7 are stitched to one of the sides of the splint body 20. As illustrated in figure 2 the patients can easily reach the said straps since they are on the front side of the leg, and has a convenient access to the pump so he or she can adjust level and volume of splint air pressure for themselves, to achieve maximum results.

Figure 3 illustrates a cross section of the splint as it is assembled on a leg 59. In this illustration it is easy to see that the splint is designed to fit the structure of the body part (the leg 59, in this example) and its joints.

The second embodiment of the invention is illustrated in figures 3, 4, 5, 6. It is designed to be assembled on an arm. The principles guiding the structure of this embodiment are similar to those of the first embodiment; it differs from the first only to fit the structure and the treatment of a human arm.

Figure 3 illustrates the second embodiment in an unassembled state. The main body of the splint is divided into two parts: for supporting the upper part of the arm 61a (between the shoulder and the elbow) and of the lower part of the arm 61b (between the elbow and the wrists). Enclosing the main body 61 are Velcro straps 62, 63 which connect to each other when the device is assembled on an arm. The main part 61a contains an aperture for the shoulder 67 and the main part 61b includes an aperture for the palm 66 and a supporting surface for the palm and hand 65.

Like the main body of the first embodiment these two sections are both comprised of inflatable tubes which, when assembled on the arm, are designed to support the arm from three directions. Figure 4 displays a cross-section of the splint when it is inflated and unassembled. This figure clearly shows the four tubes in the splint. Velcro straps 62, 63 connect when the splint is assembled.

Also in figure 3 are the ventilating holes 68, similar to the ones on the first embodiment of this invention 52, and a support strap clip 64. This clip enables the attachment of straps that transfer the weight of the hand to the shoulders or to the waist. Figure 5 illustrates the splint assembled on an arm. The figure displays the two options of attaching the supporting straps: a suspension strap 70 around the patient's neck and a strap wrapped around the waist 71. The straps hook to the splint via the said clip 64.

Figure 5 also clearly illustrates the function of the aperture of the shoulder 67, the palm's aperture 66 and of the supporting surface for the palm 65. The structure of this embodiment of the splint is suited to hold the arm in a comfortable 90 degree angle at the elbow. Figure 6 illustrates the cross section B of the assembled splint. This figure shows that the splint provides pressure and support to the arm from four directions.

Another embodiment of the present invention is a vest splint, designed to support the rib cage. The inflatable rib-tubes of the splint are aligned to follow the inclination of the rib bones and may be inflated in sections according to necessity. The vest is wrapped around the chest leaving two apertures for the arms and is fastened in the front by Velcro straps.

These unique designs of the splints as described allows for setting and stabilizing the injured body part while providing a controlled range of flexibility. Providing necessary support to the area and improving the course of treatment for better results.

While the above description contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as exemplifications of the preferred embodiments. Those skilled in the art will envision other possible variations that are within its scope. Accordingly, the scope of the invention should be determined not by the embodiment illustrated, but by the appended claims and their legal equivalents.

What is claimed is:

1. A splint for immobilizing and supporting a limb of a human or other body parts, said splint is made of flexible material for covering said limb and limb articulation from three sides wherein a part of the limb remains uncovered, said splint includes:

- a) inflatable tubes interconnected by non-inflatable parts for achieving variable degrees of support, stiffness and restriction of movement;**
- b) ventilation holes for skin ventilation contained in the non-inflatable parts;**
- c) at least one gas pressure source device connected to said splint;**
- d) at least one adjustable surface for connecting splint edges;**
- e) at least one loop connected to the edge of said splint for suspension purposes.**

wherein the inflated structure of the splint fits the structure of the appropriate body part for the purpose of stabilizing and providing support to the patient's body part and its articulations in varying degrees of rigidity and in particular positions.

2. The splint according to claim 1, wherein the adjustable straps are made of Velcro.

3. The splint according to claim 1, wherein said splint is designed to wrap the torso, taking into account the structure of the body and its curves for maximum compatibility.

4. The splint according to claim 1, wherein said splint is designed to wrap to the neck, taking into account the neck's curves and structure for maximum compatibility.

5. The splint according to claim 1, wherein said splint is designed to wrap the leg, the foot, the ankle and the heel of the patient, taking into account the leg's curves and structure for maximum compatibility and preventing pressure on the heel.

5. The splint according to claim 1, wherein said splint is designed to wrap the arm, fit the shoulder structure, support the palm taking into account the arm's curves and structure for maximum compatibility and immobilizing the shoulder joints or upper and lower arm in any desired position.

6. The splint according to claim 1, wherein said splint is made of two nylon layers joined together by soldering means.

7. The splint according to claim 1, wherein said splint is made of two nylon layers which are coated with polyurethane.
8. The splint according to claim 1, wherein movement, rigidity and stabilization of said limb articulation is controlled by the degree of air pressure in said splint.
9. The splint according to claim 1, wherein the pressure source device is a hand pump.
10. The splint according to claim 1 wherein in the inflated state the splint takes up the shape of the body part for which it was designed.
11. The splint according to claim 1 wherein the tightness of the splint on the body part is controlled by the fastening or loosening of the Velcro straps.
12. The splint according to claim 1 further including a suspension strap.
13. The splint according to claim 1 wherein pressure within the splint is controlled by a valve.
14. The splint according to claim 1 wherein the adjustable strap is detachable.

ABSTRACT

Disclosed is a medical device which operates as a supporting splint for the treatment of orthopedic conditions. Said device is an inflatable, flexible, lightweight water-resistant splint whose measure of rigidity is easily controlled by the user. According to the present invention there are several embodiments of the splint, each suited to fit a different body part such as the limbs, the torso, the chest and the neck. Said device which is constructed of inflatable tubes is made of two nylon layers soldered together and is coated with polyurethane. The tubes may be inflated by an attachable hand pump or by other means of supplying air pressure. The present invention is especially designed to allow the normal blood circulation to the treated body part, provide ventilation to the area and enable easy inspection of an injury.

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UNITED STATES

DECLARATION FOR PATENT APPLICATION

Docket No. _____

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: _____

Immobilizing and Supporting Inflatable Splint Apparatus

the specification of which

(check one)

☐ is attached hereto☐ was filed on _____ us

Application Serial No. _____

and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by an amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations §1.56(u).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
_____	_____	_____	_____	_____
_____	_____	_____	Yes	No
_____	_____	_____	Yes	No

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)

(Filing Date)

(Status-patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status-patented, pending, abandoned)

I hereby appoint as my attorney and agent Aaron B. Karas, Reg. No. 18,923, Samson Helfgott, Reg. No. 23,072, Linda S. Chan, Reg. No. 42,400, Michael Markowitz, Reg. No. 30,659, Brian Myers, Reg. No. 46,947, Harris A. Wallin, Reg. No. 39,432, Shaban Islam, Reg. No. 32,507, Emma Shleifer, Reg. No. 29,734, Serle Moxoff, Reg. No. 25,900 and Thomas J. Dean, Reg. No. 44,528 to prosecute this application and to transmit all business in the Patent and Trademark Office connected therewith.

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Full name of second joint inventor, if any Dalia Zucker
Second Inventor's Signature [Signature] Date March 7, 2004
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Post Office Address _____

Full name of third joint inventor, if any Asher Bin Nun
Third Inventor's Signature [Signature] Date March 7, 2004
Residence 11 Avah St., Carmiel 21721, Israel Citizenship Israeli
Post Office Address _____

Full name of fourth joint inventor, if any _____
Fourth Inventor's Signature _____ Date _____
Residence _____ Citizenship _____
Post Office Address _____

Full name of fifth joint inventor, if any _____
Fifth Inventor's Signature _____ Date _____
Residence _____ Citizenship _____
Post Office Address _____

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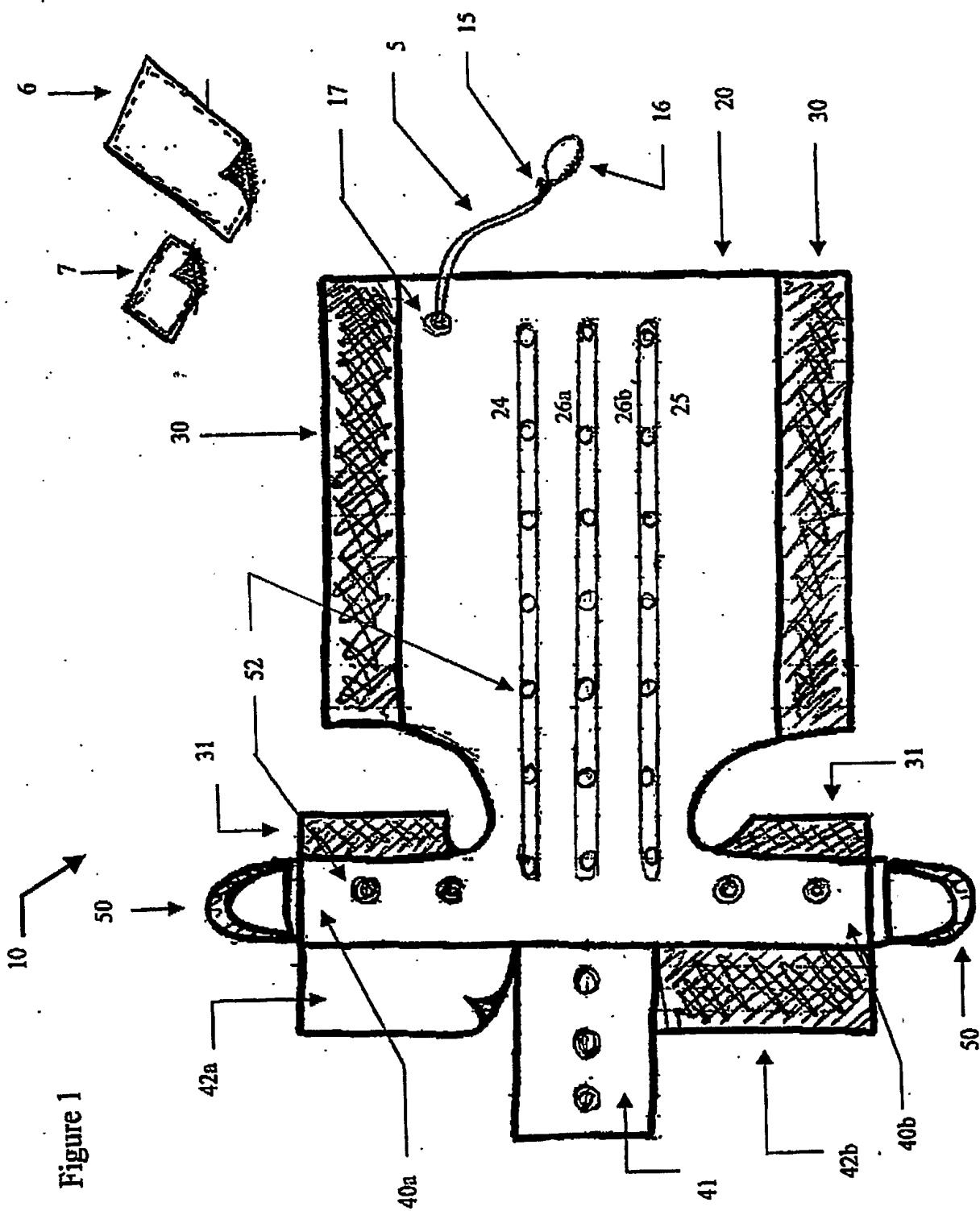
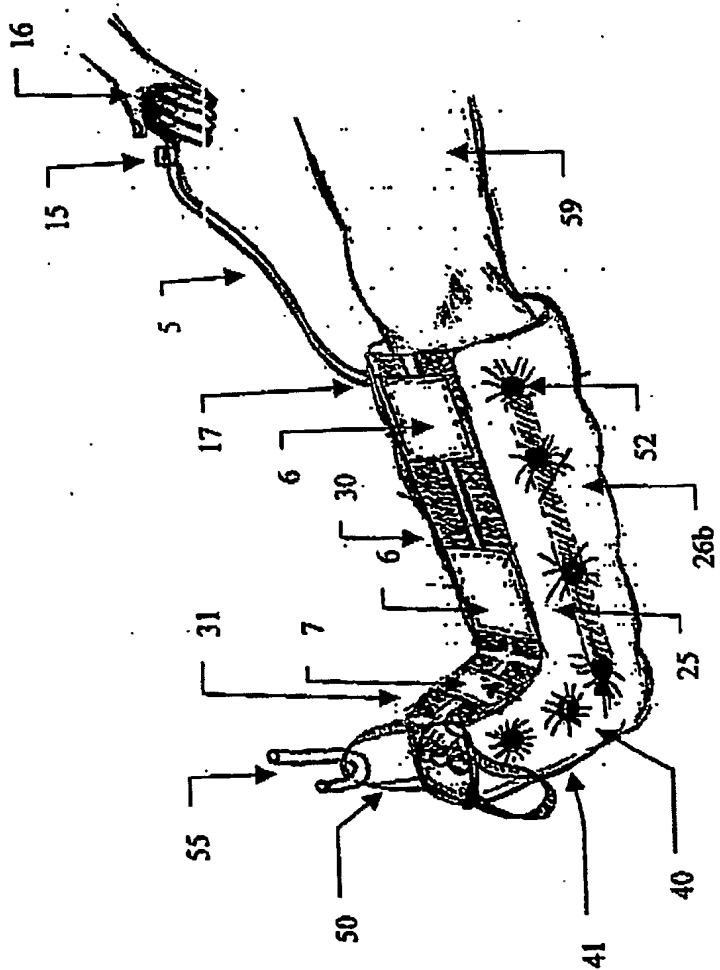


Figure 1

Figure 2



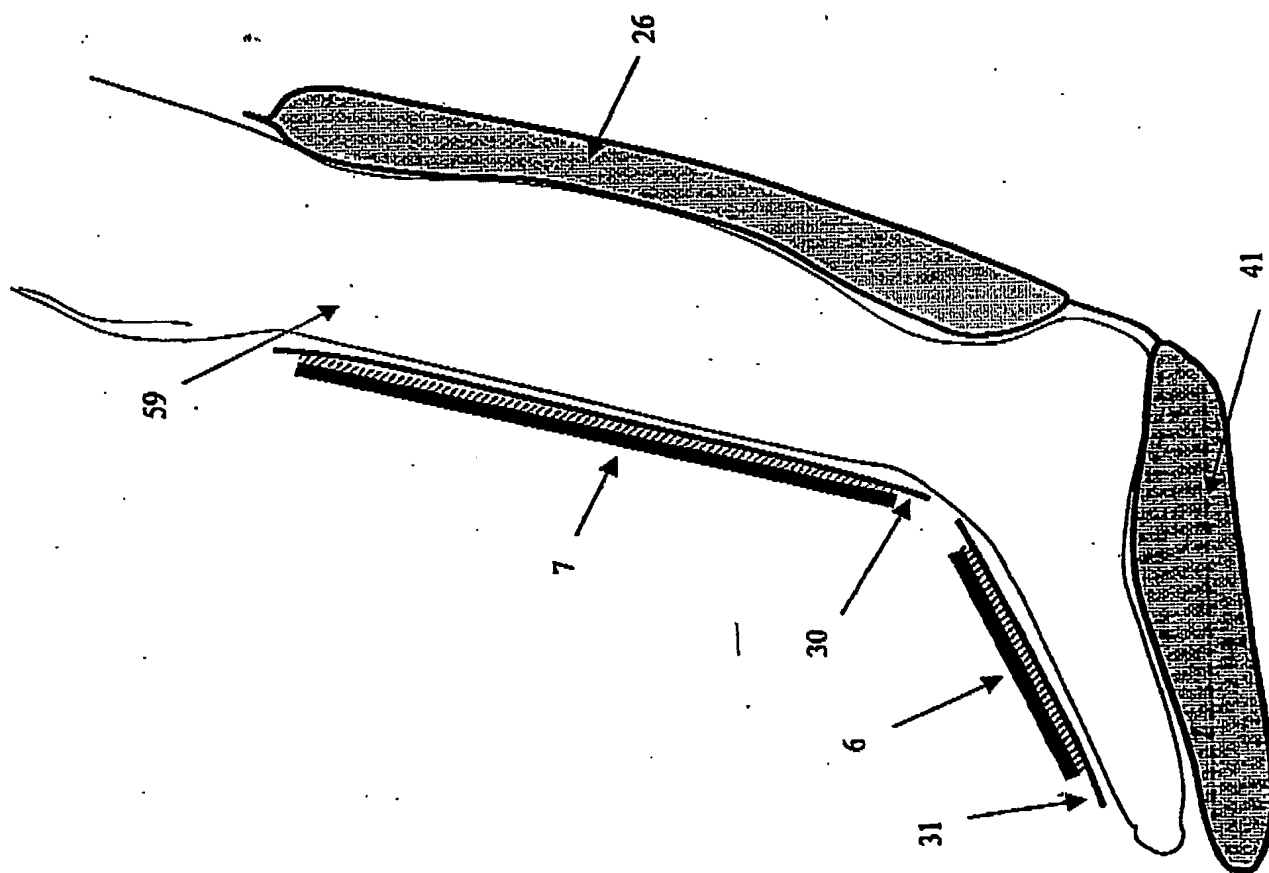


Figure 3

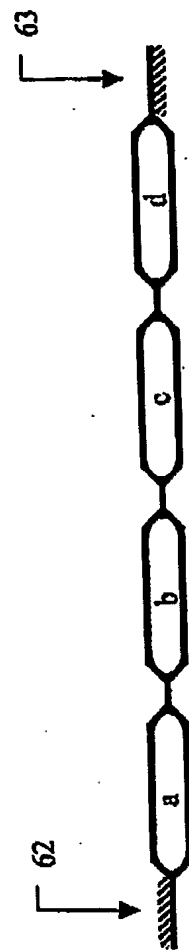
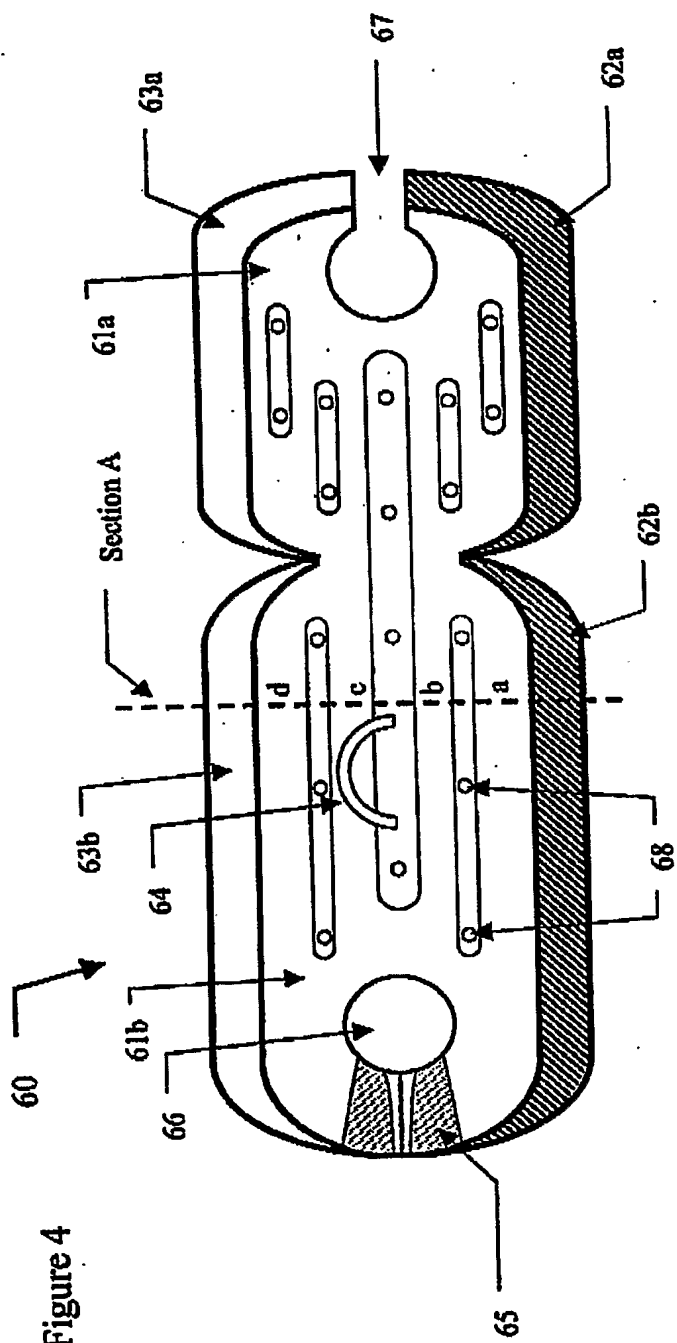


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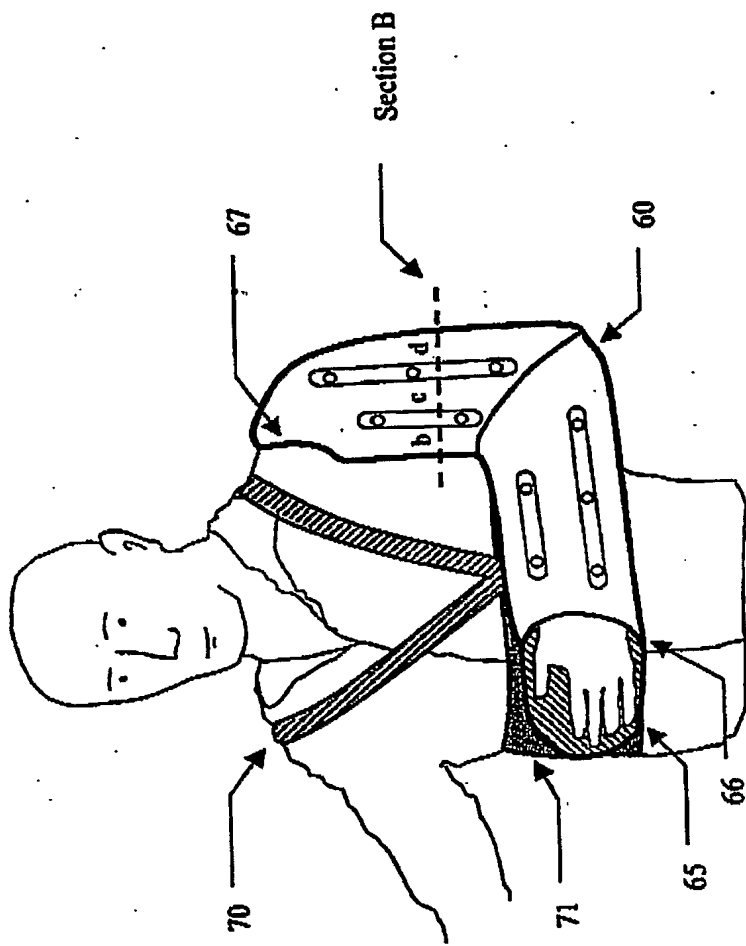
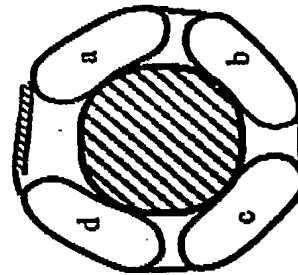


Figure 7



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